What we claim is:

1. An electrically resistive composite material comprising a conductive material and a non-conductive material.

2. The electrically resistive composite material of claim 1 wherein the non-conductive material is a non-conductive particulate material.

3. The electrically resistive composite material of claim 2 wherein the particulate material is selected from metal oxides, metal nitrides, ceramics, and mixtures thereof.

4. The electrically resistive composite material of claim 3 wherein the non-conductive particulate materials is selected from the group consisting of boron nitride, silicon carbide, alumina, silica, platinum oxide, tantalum nitride, talc, polyethylene tetra-fluoroethylene (PTFE), epoxy powders, and mixtures thereof.

5. The electrically resistive composite material of claim 1 wherein the conductive material is a metal, metalloid, alloy, or combination thereof.

6. A multi-layer foil comprising a conductive metal layer and a layer of the electrically resistive composite material of claim 1.

7. The multi-layer foil of claim 6 wherein the conductive metal layer and the conductive material are not the same material.

8. The multi-layer foil of claim 6 wherein the electrically resistive composite material layer non-conductive material is a non-conductive particulate material selected from metal oxides, metal nitrides, ceramics, and mixtures thereof.

9. The multi-layer foil of claim 8 wherein the non-conductive particulate materials is selected from the group consisting of boron nitride, silicon carbide, alumina, silica, platinum oxide, tantalum nitride, talc, polyethylene tetra-fluoroethylene (PTFE), epoxy powders, and mixtures thereof.

10. The multi-layer foil of claim 6 wherein the conductive material is a metal, metalloid, alloy, or combination thereof.

11. A multi-layer foil comprising a copper metal layer and an electrically resistive composite material layer associated with the copper metal layer shiny surface wherein the electrically resistive composite material layer includes from about 0.01 to about

99.9 area % of a conductive metal other than copper and from about 0.01 to about 99.9 area % of particles of a non-conductive material selected from alumina, boron nitride, and mixtures thereof.

12. A circuit board including an integral resistor comprising;

(a) an insulative substrate layer having first surface and a second surface;

(b) an integral resistor located on the insulative substrate first surface wherein the integral resistor further comprises an electronically resistive composite material including a conductive material and a non-conductive material wherein the integral resistor has a first end and a second end; and

(c) a first conductive metal layer associated with the integral resistor first end and a second conductive metal associated with the integral resistor second end.

13. The multi-layer foil of claim 12 wherein the electrically resistive composite material layer non-conductive material is a non-conductive particulate material selected from metal oxides, metal nitrides, ceramics, and mixtures thereof.

14. The multi-layer foil of claim 13 wherein the non-conductive particulate materials is selected from the group consisting of boron nitride, silicon carbide, alumina, silica, platinum oxide, tantalum nitride, talc, polyethylene tetra-fluoroethylene (PTFE), epoxy powders, and mixtures thereof.

15. The multi-layer foil of claim 12 wherein the conductive material is a metal, metalloid, alloy, or combination thereof.

16. A method for manufacturing a printed circuit board including an integral resistor comprising the steps of:

(a) applying a first photosensitive etch resistant material to a laminate including an insulative substrate, a conductive metal layer having an exposed top surface, and a resistive material layer located between the conductive metal layer and the insulative substrate, wherein the photosensitive etch resistant material is applied to the exposed top surface of the conductive metal layer;

(b) irradiating at least a portion of the photosensitive etch resistant material to give irradiated portions of the photosensitive etch resistant material and non-irradiated portions of the photosensitive etch resistant material;

(c) removing a portion of the photosensitive etch resistant material to expose a

portion of the conductive metal layer that does not correspond to the integral resistor;

(d) removing the conductive metal layer and the resistive material layer exposed in step (c) to form a partially formed integral resistor;

(e) removing the portion of the photosensitive etch resistant material from the partially formed integral resistor;

(f) applying a second photosensitive etch resistant material to the partially formed integral resistor;

(g) masking portions of the second photosensitive etch resistant material and irradiating the unmasked portions of the second photosensitive etch resistant material to form an integral resistor; and

(h) removing the photosensitive etch resistant material that covers the integral resistor and removing the conductive metal layer associated with the integral resistor to expose the underlying resistive material layer to form the integral resistor.

17. The method of claim 16 wherein the electrically resistive material is a co-deposit material including a conductive material and a non-conductive material wherein the conductive metal layer and the conductive material are not the same material.

18. The method of claim 17 wherein the non-conductive material is a non-conductive particulate material selected from metal oxides, metal nitrides, ceramics, and mixtures thereof.

19. The method of claim 18 wherein the non-conductive particulate material is selected from the group consisting of boron nitride, silicon carbide, alumina, silica, platinum oxide, tantalum nitride, talc, polyethylene tetra-fluoroethylene (PTFE), epoxy powders, and mixtures thereof.

20. The method of claim 16 wherein the multi-layer foil includes a copper metal layer having a shiny surface and a matte surface and an electrically resistive co-deposit layer associated with the copper metal layer shiny surface wherein the electrically resistive co-deposit layer includes from about 0.01 to about 99.9 wt% of a conductive material other than copper and from about 0.1 to about 99.9 wt% of particles of a non-conductive material selected from alumina, boron nitride, and mixtures thereof.

Add A3

Add E2